

Mr. VIVIAN. The same percentage applied to roughly half a billion dollars a year under some recent water pollution bills suggests a figure of \$50 million a year as a nominal amount that ought to be going into water pollution research. This is probably not enough.

Dr. TUKEY. I think that is probably not nearly enough because these percentages ought to be on both capital improvements and operating costs. The operating costs for present water pollution facilities are substantial.

Mr. VIVIAN. At the moment do you have any definite cost-benefit guidelines to use in deciding how much should go into R. & D.?

Dr. TUKEY. No.

Mr. VIVIAN. One would probably have to form his estimate, as you say, from the industries with heavy R. & D. orientation.

Dr. TUKEY. Industries in an area where innovation is proceeding at a high rate, and not the most extreme cases, but what happens in the high innovation industries in general.

Mr. DADDARIO. Will the gentleman yield?

Mr. VIVIAN. Yes.

Mr. DADDARIO. Dr. Tukey, you are only saying that this is one way to come to an estimate.

Dr. TUKEY. If I am asked to come to an estimate today, that is how I come to an estimate. At some other time I am sure other ways could be found. I think the situations are not all that different.

Mr. CONABLE. This assumes you have an adequate technology now which needs upgrading?

Dr. TUKEY. No; I would—

Mr. CONABLE. Well, no business would go into production unless it had an adequate technology to start with, would it?

Dr. TUKEY. I don't think we should spend time discussing the word "adequate," and I think that's all we would get into.

Mr. DADDARIO. Mr. Vivian?

Mr. VIVIAN. Supposing I skip for a moment to the subject of support of R. & D. in terms of total quantity or in terms of distribution between Federal and private sources and then come back to just the Federal side. In environmental pollution activities, how can we better allocate our funds between in-house research and Government laboratories and university research—nominally sponsored by the Federal Government in this case because it certainly is sponsored by other sources—as well as the question of public education, administrative controls and enforcement, and so forth. Do you have any strong feelings as to what changes should occur in distribution in research between Government-performed and Government-sponsored activity and the administrative structure that administers this research?

Dr. TUKEY. I think I will only respond to a very small part of that question and say it seems to me—it seemed to us on the Panel when we were putting our recommendations together, that there were agencies in the Government that needed the stimulation of a stronger interaction with the university and college community than they had. That not only would they be able to get research done effectively and efficiently by doing more contracting out, but that they would be able to get a better inflow of ideas and a better bringing of their problems to the attention of the generations of students as they come along, so